Actisense®

NBF-3

NMEA® 0183 Buffer

User Manual

For all variants:
NBF-3-BAS, Rev A

Issue 1.01

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Important Notices

CE The NBF-3 complies with the Electromagnetic Compatibility requirements according to EN60945. The unit should always be used in conjunction with appropriate CE marked, shielded cable and connectors to ensure compliance. A declaration of conformity is available for download at **www.actisense.com**.

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The products described in this manual and the specifications thereof may be changed without prior notice. Active Research Ltd cannot accept any liability for differences between the product and this document. To check for updated information and specifications please contact Active Research Limited.

Active Research Limited will not be liable for infringement of copyright, industrial property rights, or other rights of a third party caused by the use of information or drawings described in this manual.

Product Registration

Please register your product via the online form **www.actisense.com/support/prodreg.html**.
Your product package includes a unit serial number. Your registration will assist Actisense Support to link your product to your details, simplifying any future assistance you may require.

Product Guarantee

This product comes with a three year ‘return to base’ guarantee. If you suspect that the unit is faulty please refer to the **“Troubleshooting Guide” on page 14**.
It is a requirement of the guarantee that all installations of electronic equipment follow the NMEA 0400 specification. Any connection to a battery or power supply must meet the mandatory essential safety requirements that may be imposed by local regulatory agencies.
Actisense products are intended for use in a marine environment, primarily for below deck use. If a product is to be used in a more severe environment, such use may be considered misuse under the Active Research Limited guarantee.

Product Disposal

Please dispose of this product in accordance with the WEEE Directive. The product should be taken to a registered establishment for the disposal of electronic equipment.

Product Overview

The Actisense NMEA Buffer (NBF-3) distributes up to six identical data streams from a single source. Signals are buffered to ensure each receiver has the required voltage levels. Isolation on the input and each output allows non-isolated devices to be connected safely. The ability to power the source device allows the option of a single cable to connect both power and data to the source device.

Features

- Works automatically with any serial protocol, including NMEA 0183
- Works automatically at any baud rate up to 115200 Baud
- Galvanic opto-isolation on the input meets the latest NMEA 0183 specification
- ISO-Drive™ provides galvanic isolation on the outputs to prevent ground loops
- Compatible with all NMEA 0183 versions without requiring configuration
- Inputs and outputs compatible with RS422 and RS232 devices
- DIN rail mountable
- Pluggable screw terminals for quick and easy installation and diagnostics
- Power and data input indicator LEDs
- Amplification of weak input signals
- Power feed for single cable installation to the NMEA Talker
- Waterproof electronics and splash proof connections

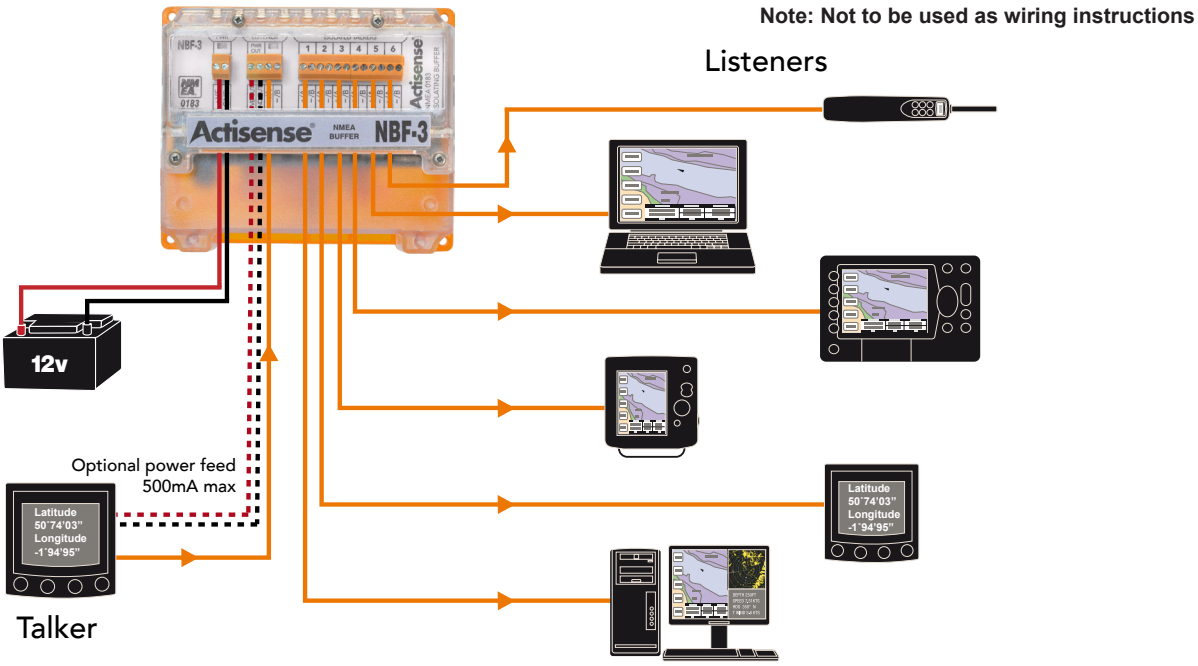

Figure 1 - Example of a Typical NBF-3 Installation

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Package Contents

1 x NBF-3-BAS with pluggable screw terminals.
1 x Actisense CD in sleeve (Documents and Software)
1 x NBF-3 User Manual
1 x Connector cover
4 x Connector cover screws
4 x Mounting screws

Accessories Supplied Separately

DIN-KIT-1 mounting kit for use with DIN rails

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Installation Warnings

All warnings and notices must be followed to ensure the correct operation of the NBF-3. Incorrect installation may invalidate the guarantee.
It is highly recommended that all of the installation instructions are read before commencing the installation. There are important warnings and notes throughout the manual that should be considered before the installation is attempted.

Warning 1: Accuracy
The Actisense NBF-3 is designed to accurately transfer data from the input to its outputs. No data integrity checking is performed by the NBF-3. Any incomplete, inaccurate or corrupt data received on the NBF-3 input will be duplicated to the NBF-3 outputs. The accuracy of the data is dependant on the NMEA Talker or other source device that generated the data.

Warning 2: Installation and Operation
This product must be installed and operated in accordance with the instructions provided. Failure to do so could result in personal injury, damage to your boat and/or poor product performance.

Warning 3: Installation Code of Practice
When wiring the power supply to the NBF-3 ensure the isolation switch is off. Wiring the NBF-3 while the connection is live may damage the NBF-3 and is in breach of the guarantee. Any connection to a battery or power supply must meet the mandatory essential safety requirements that may be imposed by local regulatory agencies.
All wiring should be in accordance with the requirements of the NMEA 0400 installation specification.

Warning 4: Mounting Requirements
Select a flat location to mount the NBF-3. Mounting on a contoured surface may cause damage to the case.
Do not mount the NBF-3 while the device is powered.
Do not mount the NBF-3 while the cable harness is connected.
Note that the terminals are pluggable for easy disconnection when mounting or removing the NBF-3.

Warning 5: Mounting Locations
Do not mount the NBF-3 in the same plane as transmitting or receiving antennas.
Mounting the NBF-3 close to a standard or steering compass may affect the operation of the compass. This distance will vary dependant on the compass type, typically a minimum of 1 meter (3ft) is recommended.

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Mounting the NBF-3

Bulkhead Mounting

Method:

- Use the NBF-3 as a template to locate and mark the drill holes for mounting. Do not attempt to drill the holes while the NBF-3 is in position
- Refer to **"Warning 5: Mounting Locations" on page 8**
- Four M3.5 stainless steel pan-head screws are provided with the NBF-3 for mounting to the bulkhead. If these screws are lost, suitable alternatives may be used. **Note:** Using larger or counter sunk screws can damage the housing and invalidate the guarantee
- Secure directly to a bulkhead using the mounting screws provided with the unit

Refer to the **"Dimensions" on page 15**.

DIN Rail Mounting

Requirements:

- An Actisense DIN Rail Kit (optional accessory, purchased separately: **DIN-KIT-1)**
- A top hat rail, type EN 50 022 or a G section rail, type EN 50 035

Mounting on a different rail type or using an alternative mounting kit or screw may breach the terms and conditions of the guarantee.

Method:

- Refer to **"Warning 5: Mounting Locations" on page 8**
- Attach the mounting kit to the base of the NBF-3 with the kit supplied screws. There is provision to mount the NBF-3 vertically or horizontally (recommended). Using alternative screws may not be reliable or may result in damage to the housing and invalidate the guarantee

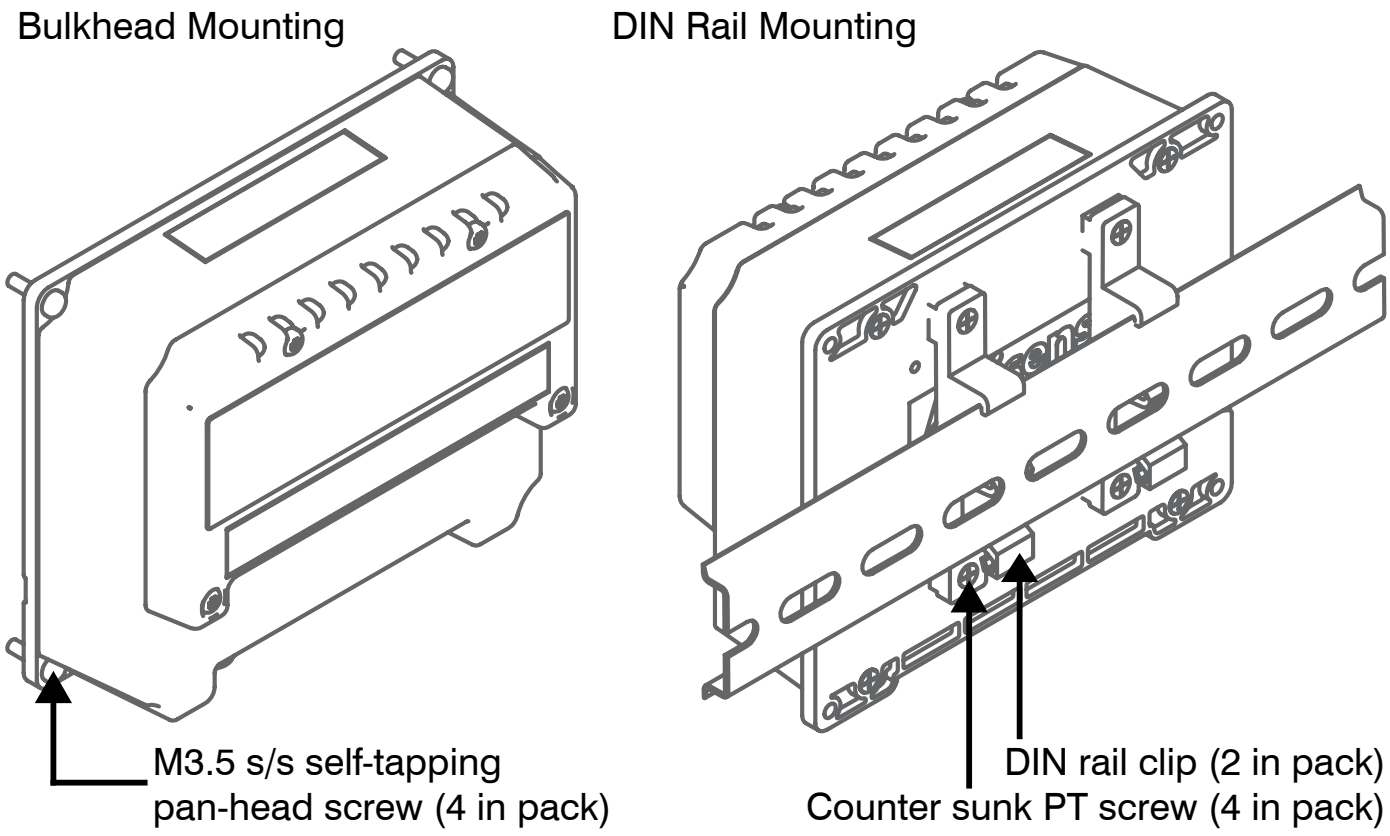
Bulkhead Mounting
DIN Rail Mounting
M3.5 s/s self-tapping
pan-head screw (4 in pack)
DIN rail clip (2 in pack)
Counter sunk PT screw (4 in pack)

Figure 2 - Mounting Options

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Connecting Power to the NBF-3

- Refer to **"Warning 3: Installation Code of Practice" on page 8**.
- The NBF-3 requires a power source providing between 10 and 35 Volts DC.
- Connect the positive supply wire to the **'PWR +VE'** screw terminal of the NBF-3.
- Connect the negative / ground supply wire to the **'PWR GND'** screw terminal of the NBF-3.
- The NBF-3 should only be used with standard negative ground DC systems.
- The input supply connection has continuous reverse polarity and ESD protection.
  Note: This protection is only on the power input, for details of the power output refer to **"Powering the Talker from the NBF-3 Listener Port" on page 11**.
- Once all connections have been made, turn on the supply. For details on the power indicator, refer to **"NBF-3 Power LED (Blue)" on page 14**.

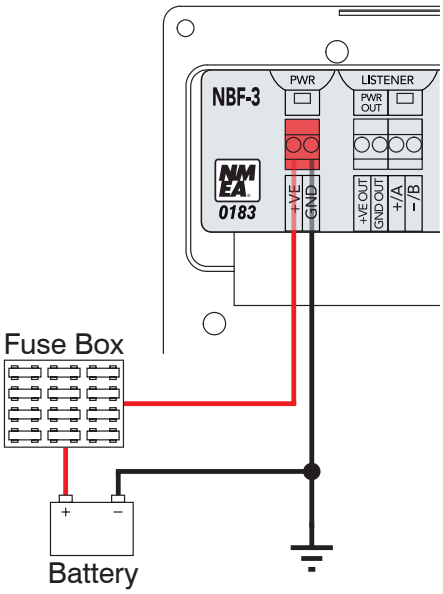

Figure 3 - Power Connection Diagram

NMEA 0183 Listener and Talker Designations

The NMEA have updated the NMEA 0183 specification to ensure a consistent naming convention is used for labelling ports. The designation follows the same rules as used for Rx and Tx labelling but uses Talker and Listener instead.
The input / receiving (Rx) port will be labelled as a 'Listener' port.
The output / transmitting (Tx) port will be labelled as a 'Talker' port.
When a port is labelled 'Listener' it is an input and when it is labelled 'Talker' it is an output.

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Connecting to the NBF-3 Listener Port

Connecting an NMEA Talker

The input to the NBF-3 is labelled 'Listener' and this is where the NMEA Talker should be connected.

- Connect the NBF-3 Listener A/+ to the positive data line of the NMEA Talker.
- Connect the NBF-3 Listener B/- to the negative data line of the NMEA Talker.
  This is the ground / common connection of the Talker for RS232 or NMEA 0183 version 1 Talkers.
- For details on the data indicator, refer to **"NBF-3 Listener Port Data LED (Green)" on page 14**.

Note: Only one NMEA Talker can be connected to the NBF-3 Listener port. Multiple NMEA Talkers require an NMEA Multiplexer to be fitted, see **www.actisense.com/NDC-4**.

Note: The NMEA Listener port is fully isolated and is compatible with all versions of NMEA 0183 and with RS422, RS232 and RS485 voltage levels, see **"Specifications" on page 15**.

Powering the Talker from the NBF-3 Listener Port

It is also possible to power the NMEA Talker from the NBF-3. The NBF-3 power connection is routed to the Listener port **PWR OUT** connection via a self-resettable fuse. A maximum of 500mA can be provided to the NMEA Talker at the voltage supplied to the NBF-3.

- Connect the NBF-3 **+VE OUT** to the positive supply input of the NMEA Talker.
- Connect the **GND OUT** of the NBF-3 to the negative supply or ground input of the NMEA Talker.

Note: The current provided is temperature dependant, see **"Specifications" on page 15**.

Note: If the NBF-3 power supply is incorrectly wired (reverse polarity), the Listener power output voltage will also be reverse polarity and could potentially harm any connected equipment. However the NBF-3 electronics are always protected against reverse polarity supply faults.

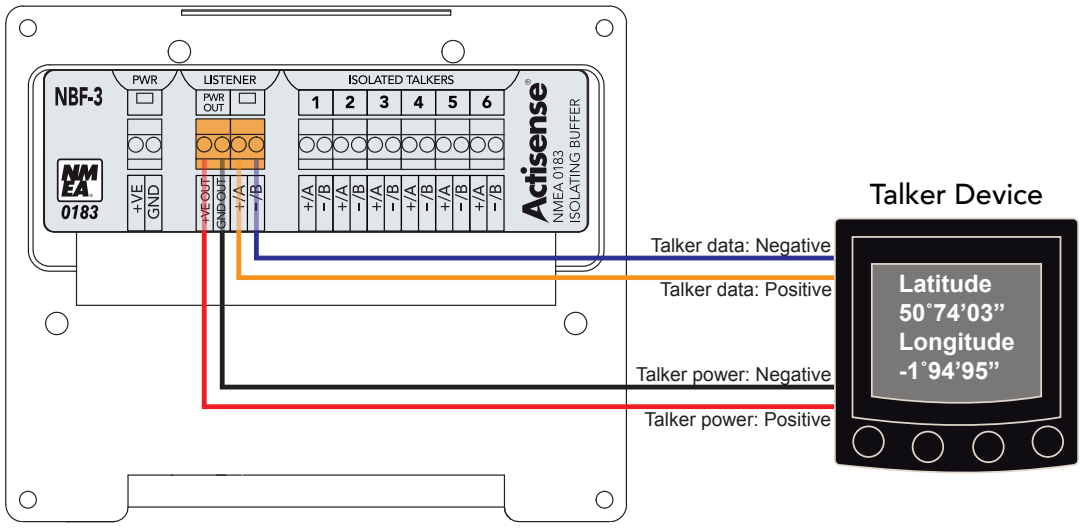

Figure 4 - Listener Port Wiring Diagram

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Connecting an RS232 Device (PC) as a Talker

A PC can be connected the same way as an RS232 type NMEA Talker.

- Connect the NBF-3 Listener A/+ to the Tx pin of the RS232 connector. On a standard 9 pin D-type connector, this is pin 3.
- Connect the NBF-3 Listener B/- to the Ground pin of the RS232 connector. On a standard 9 pin D-type connector, this is pin 5.

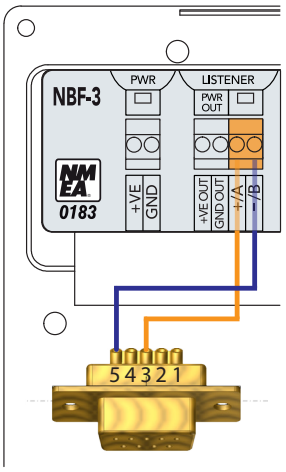

Figure 5 - RS232 Talker Connection

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Connecting Listeners to the NBF-3 Talker Ports

- Connect the NBF-3 Listener A/+ to the positive data line of the NMEA Talker.
- Connect the NBF-3 Listener B/- to the negative data line of the NMEA Talker. When connecting RS232 or NMEA 0183 version 1 Talkers, this will be the ground / common line of the Talker. Always check the manual for the correct wiring.

Note: All six Talker port connections are identical. Any number of Talker ports can be used in any combination.

The NBF-3 can drive multiple Listeners from each Talker port. Check the input current requirements of each Listener and ensure the combined total does not exceed the "Talker Output Current Drive", see **"Specifications" on page 15**.

Note: Each Talker port is fully isolated, but be aware that the NBF-3 will not provide isolation between multiple Listeners connected to a single Talker port. Connecting more than one NMEA Listener is only recommended when all NMEA Listeners are known to have isolated inputs.

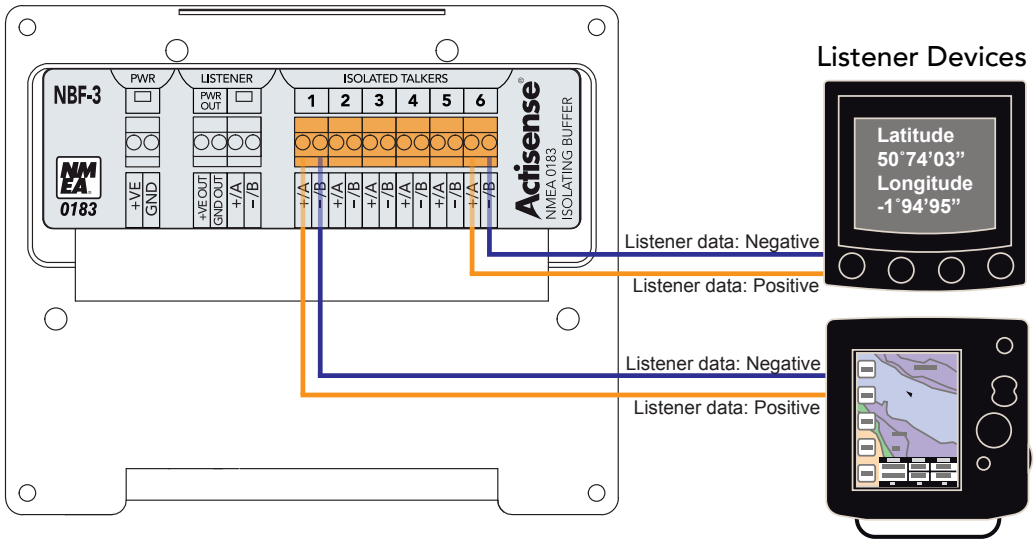

Figure 6 - Talker Port Wiring Diagram

Connecting an RS232 Device (PC) as a Listener

A PC can be connected the same way as an RS232 type NMEA Listener. The PC should be connected as follows:

- Connect the NBF-3 Talker A/+ to the Rx pin of the RS232 connector.
  On a standard 9 pin D-type connector, this is pin 2.
- Connect the NBF-3 Talker B/- to the Ground pin of the RS232 connector.
  On a standard 9 pin D-type connector, this is pin 5.

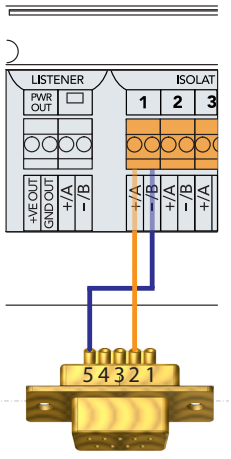

Figure 7 - RS232 Listener Connection

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Troubleshooting Guide

The first thing to check when the NBF-3 is not performing as expected are the indicator LED's.

LED Indicators

NBF-3 Power LED (Blue)
There is a power LED located above the power supply terminal connectors labelled PWR. This LED is visible through the connector cover. When the NBF-3 is connected to a suitable power supply the LED will light.

If the Power LED (Blue) does not light:
- Ensure that the power terminal plug is correctly located and seated.
- Ensure that the wires are securely connected to the plug.
- Ensure that positive power and ground have been connected.
- Ensure that any external power fuse has not blown and that the external power isolation switch is closed.
- Ensure that the power supply meets the Voltage and Current requirements as defined in the Specifications.

NBF-3 Listener Port Data LED (Green)
Indicates data being received on the Listener port. The LED flashes synchronously with received data. For high data rates the LED may appear to be permanently on (and may appear slightly dim due to the fact that it is flashing fast).

If the Data LED (Green) does not light:
- Ensure that the NBF-3 has power, see **"LED Indicators"** above.
- Ensure that the NMEA Talker is powered and is configured to output data.
- Ensure that the Listener port terminal plug is correctly located and seated.
- Ensure that the wires are securely connected to the plug.
- Two data wires must always be connected to the NBF-3's Listener port. If a negative data wire is not available, the NMEA Talker's ground should be connected to the B/- input on the NBF-3's Listener port.
- Confirm the polarity of the data wires are correct.

No Data on an Output

- Confirm the power and input LED indicators are active, see **"LED Indicators"** above.
- Ensure that the plug is correctly located and seated.
- Ensure that the wires are securely connected to the plug.
- Two data wires must always be connected on the NBF-3's Talker port. If a negative data wire is not available, the NMEA Listeners ground should be connected to the B/- output on the NBF-3's Talker port.
- The Listener needs to use the same baud rate as the Talker. The NBF-3 cannot change the baud rate, so the baud rate on the input is the same as the baud rate on each of the outputs. For a PC connection, ensure the correct baud rate is selected when opening the Com port.
- For PC connections the NMEA Reader application can be used to confirm the data. NMEA Reader is included on the CD but the latest version can be downloaded here: **www.actisense.com/NMEAReader/Downloads**
  Note: If the software application has control over the port settings, select: No parity, 1 stop bit, 8 data bits and no flow control. NMEA Reader automatically sets these values.

Technical Support and the Returns Procedure

All installation instructions and any warnings contained in this manual must be applied before contacting Actisense Technical Support. If the troubleshooting guide did not help resolve the problem and an error persists, please contact Actisense Technical Support **support@actisense.com** to help trace the issue before considering the return of the product. If Actisense support concludes that the NBF-3 unit should be returned to Actisense, a Returns Number will be issued by the support engineer.

The Returns Number must be clearly visible on both the external packaging and any documentation returned with the product. Any returns sent without a Returns Number will incur a delay in being processed and a possible charge.

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Specifications

Power Supply	
Input Supply Voltage	10 to 35V DC
Input Supply Current (NBF-3 only)	100mA max @ 12V DC (all outputs @ full drive into 100Ω loads)
Input Supply Connector	Pluggable 2 way screw terminal, 3.5mm pitch
Input Protection (NBF-3 only)	Continuous reverse polarity and ESD protection
Power Indicator	LED, blue (lit constantly indicates correct operation when input supply connected)
Listener Power Output Voltage	10 to 35V DC derived directly from the input supply voltage
Listener Power Output Current	500mA max @ <= 30°C (see note)* (PTC self-resettable fuse)
Listener Power Output Connector	Pluggable 2 way screw terminal, 3.5mm pitch
NMEA 0183 Port - Listener & Talkers	
Number of Listener / Input Ports	One isolated NMEA 0183 Listener
Number of Talker / Output Ports	Six isolated NMEA 0183 Talkers
Compatibility	Fully NMEA 0183, RS422 & RS232 compatible. RS485 Listener compatible
Galvanic Isolation	2500V input to ground 1500V output to ground using **ISO-Drive**
Speed / baud rate	4800 to 115200 bps
Talker Output Voltage drive	>= 2.1V (differential) into 100Ω
Talker Output Current drive	20mA max.
Talker Output Protection	Short circuit and ESD
Listener Input Voltage Tolerance	-15V to +15V continuous, -35V to +35V short term (<1 second)
Listener Input Protection	Current limited, overdrive protection to 40V DC and ESD protection
Listener Data Indicator	LED, green (flashes at data rate)
Connectors	Pluggable 2-way screw terminals, 3.5mm pitch
Approvals and Certifications	
EMC	EN 60945 (sections 9 & 10)
Environmental Protection	IP66
Operating Temperature	-20°C to +70°C
Storage Temperature	-40°C to +85°C
Relative Humidity	0 to 80% RH
Guarantee	3 years

All specifications are taken with reference to an ambient temperature (TA) of +25°C.

**Higher temperatures may cause the fuse to trip at less than 500mA.*

Mechanical	
Housing Material	Polycarbonate
Protective Lid Material	Polycarbonate
Sealing Materials	Expanded silicone foam gasket, closed cell polyurethane splash guard and ePTFE waterproof vent
Dimensions	127mm (L) x 106mm (W) x 48mm (H)
Weight	210g
Mounting	4 x 3.5mm lugs to allow panel mount with self tapping screws (included), optional DIN rail mount available on request.

Dimensions

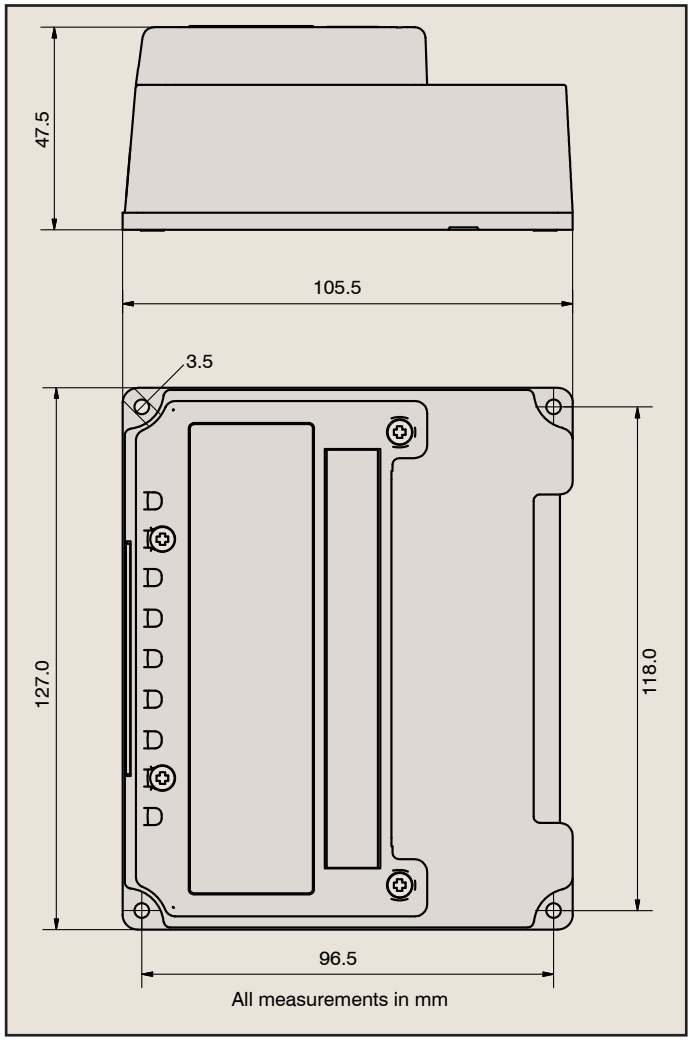

Figure 8 - Dimension Diagram

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NBF-3 Product Order Codes

Part Number	Description
NBF-3-BAS	NMEA Buffer with an OPTO input, 6 ISO-Drive™ outputs and Talker power feed
	Accessory Description
DIN-KIT-1	DIN Rail mounting kit suitable for use with rail types: Top hat rail EN 50 022 or G section rail EN 50 035

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